

**Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington, D.C. 20554**

In the Matter of	)	
	)	
Inquiry Regarding Carrier Current Systems	)	ET Docket No. 03-104
Including Broadband over Power Line Systems	)	
	)	
	)	

To: The Office of Engineering and Technology

**COMMENTS OF ELECTRIC BROADBAND**

James A. Stenger

THELEN REID & PRIEST LLP  
701 Pennsylvania Avenue, N.W.  
Suite 800  
Washington, DC 20004  
(202) 508-4308

Dated: July 7, 2003

Its Attorneys

## **SUMMARY**

Electric Broadband is a solutions provider to the BPL industry formed by Plexeon Logistics, Inc. and the Shpigler Group to provide both technical expertise in network design and construction and business expertise in analysis and formation of new business enterprises. Electric Broadband is providing consulting services to the United Power Line Council, the National Rural Electric Cooperative Association, the City of Manassas, Virginia, and other public and private clients.

The Commission should avoid a static analysis of BPL technology and services that exaggerates RF emissions issues. BPL technology is a last mile solution that will be used in hybrid networks and as part of a “smart build strategy” that will result in increasing penetration of fiber into service areas. As this process proceeds, RF emissions concerns will recede. Moreover, experience with BPL systems to date indicates that they comply with the carrier current system rules and that the emissions limits can be increased without causing harmful interference to other users.

Likewise the Commission should avoid exaggerating the difficulty of testing BPL systems under Part 15. Many new devices require an initial period of analysis and interpretation of Part 15 and this does not make them suspect or provide an argument for restrictive treatment. The Rules already provide flexibility in the use of alternative measurement methods, make reference to industry standards such as those developed by ANSI and CISPR, and allow TCB’s to work with applicants to resolve questions.

Above all, Electric Broadband urges the Commission expeditiously to resolve this proceeding and avoid creating regulatory uncertainty with respect to this important new technology.

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Electric Broadband, by its undersigned counsel, hereby respectfully submits its Comments in response to the above-referenced Notice of Inquiry (the NOI). Electric Broadband generally supports the Commission’s effort to facilitate the rollout of broadband over power line (BPL).<sup>1</sup> Access BPL is in many respects a transitional technology. An electric utility typically cannot justify constructing a fiber network in the hopes of attracting a customer base. BPL enables the utility to sign on a customer base using existing electric lines to leverage existing assets and then extend fiber to serve that customer base in a gradual process known in the industry as “smart build.” This process will mitigate many of the concerns expressed by the Commission in the NOI. The BPL industry is satisfied that BPL service can be rolled out under the existing CCS rules, under a reasonable and appropriate interpretation thereof. To the extent that rule changes are warranted, the BPL industry also is satisfied that the existing emissions limits can be increased without harming other parties. Above all, an expeditious resolution of

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<sup>1</sup> This technology generally is referred to in the industry as power line communications (PLC) and continues to be referred to as PLC in Europe and Japan. While we use the term “BPL” for purposes of this NOI, we urge the Commission to revert to the use of the industry and internationally accepted terminology for this service, as the Commission did in its conducted emissions proceeding. NOI at para. 8.

this proceeding is essential to remove any regulatory uncertainty that might impede the rollout of BPL.

#### I. Electric Broadband's Interest In This Proceeding.

Electric Broadband is the premier solutions provider to the BPL industry. Electric Broadband was formed by a merger of Plexeon Logistics, Inc. and the Shpigler Group. Electric Broadband combines the technical expertise of Plexeon Logistics in network design and construction with the business expertise of the Shpigler Group in analysis and formation of new business enterprises.

Plexeon was formed by Lance Rosen and has been involved in constructing complex hybrid communications systems<sup>2</sup> since 1998. Plexeon was one of the first network design and construction companies to become interested in the potential of BPL in 2001.

The Shpigler Group was formed by David Shpigler to provide economic consulting services. The Shpigler Group was one of the first consulting companies to study the business case for BPL. The Shpigler Group was retained by the United Telecom Council (UTC) and the United Power Line Council (UPLC) to provide the first extensive business case study for BPL in 2002 and has been retained to update that study in 2003.

Electric Broadband is providing technical and business analysis of BPL for a number of entities. They are working on the 2003 BPL report for the UPLC. They recently completed a report for the National Rural Electric Cooperative (NRECA) that is specifically directed to the feasibility of using BPL to serve rural areas.<sup>3</sup> They are providing services to some the earliest

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<sup>2</sup> A hybrid system is one that combines fiber with other media. Cable television, for example, is provided via a hybrid fiber-coaxial cable system. Likewise, BPL networks will be hybrid systems, integrating fiber, BPL, and wireless components.

<sup>3</sup> The NOI notes, "BPL technology could play an important role in enabling Internet and high-speed broadband access to rural areas, because power lines reach virtually every home in the United States." NOI at para. 9. Electric Broadband's work for NRECA will put the meat on the bones of this conceptual notion.

adapters of BPL technology, such as the City of Manassas, Virginia, Pennsylvania Power & Light, and others.<sup>4</sup>

They and their clients will be directly affected by this proceeding.

## II. Response to Commission Questions.

Electric Broadband, to the best of its knowledge and belief, is happy to attempt to answer some of the specific questions posed by the Commission. Electric Broadband appreciates the Commission's efforts to facilitate the deployment of BPL and wishes to provide the Commission with the benefit of its experience in this area on both the technical and business side.

With regard to emissions limits, in its work with the leading vendors and utilities who are the early adopters of BPL technology, Electric Broadband has not seen interference issues arise under the existing CCS rules. Experience appears to indicate that those limits can and should be raised to improve the functionality of BPL technology without harming other users. Electric Broadband believes that BPL test data already provided to the Commission, as well as the additional data that will be submitted in response to this NOI will establish that BPL devices that comply with the existing CCS rules will not cause harmful interference to other users, and the limits can be increased without causing harm.

With regard to measurement methods, Electric Broadband also believes that experience under the existing test procedures demonstrates that the existing rules, reasonably interpreted, are adequate to ensure predictable and repeatable results, and that such experience has yielded sufficient information to enable the Commission to propose specific, targeted rule interpretations and modifications that will facilitate rather than complicate BPL rollout.

With this general background, Electric Broadband turns to some of the more specific questions raised by the Commission.

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<sup>4</sup> These Comments represent the views only of Electric Broadband and not its clients.

## A. Emissions Limits

The NOI recognizes that the CCS rules apply to BPL.<sup>5</sup> However, the Commission also notes that the “new generation of high-speed BPL devices that use wide spectrum was not contemplated under the existing Part 15 rules when they were formulated.”<sup>6</sup> Technological improvements in carrier current systems are based upon “faster chip sets” and “sophisticated modulation schemes.”<sup>7</sup> Experience with BPL modems using either OFDM or DSSS modulation schemes shows that both can comply with existing CCS emissions limits. Experience also shows that the BPL signal can travel farther and/or achieve greater data throughput at higher emission levels without causing harmful interference to other users.

### 1. Access BPL

With respect to the questions posed in para. 15 of the NOI, access BPL currently uses the lowest frequencies available, typically below 30 MHz because lower frequency signals travel further. BPL is part of a hybrid fiber – BPL network. The shorter the BPL component, the further the fiber has to extend into the neighborhood to provide service. Conversely, the longer the BPL signal travels, the greater the ability of the service provider to use an existing wire – the medium voltage electric line – and avoid the cost of new fiber.

While the above might logically lead to the assumption that access BPL should operate on the lower frequency range and in-house BPL should operate on a higher frequency range, the industry is working on a variety of technological approaches to link access and in-house BPL into a seamless service. Therefore, Electric Broadband does not see a need for the Commission to dictate frequencies, modulation techniques, nor contention resolution rules.

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<sup>5</sup> NOI at para. 4 and Note 4.

<sup>6</sup> NOI at para. 7.

<sup>7</sup> NOI at para. 7.

Data transmission speeds are adequate for some types of service under the existing emissions limits.<sup>8</sup> Products are available now and are being deployed. Speeds could be improved and service offerings widened with appropriate increases in emissions limits. New generations of products quickly could take advantage of any liberalization of the rules that is adopted by the Commission. Speeds can be increased significantly as the “smart build” process allows fiber to be pushed closer to the user.<sup>9</sup>

Standards work is being done here, in Europe and in Japan. The Commission can assist this process by providing regulatory clarity with respect to the emissions limits that define the boundaries within which standards must be developed.

## 2. In-house BPL.

With respect to the questions posed in para. 17 of the NOI, we have noted above that the Homeplug Powerline Alliance (HPA) and others are working on the seamless integration of in-house and access BPL. It is important for the Commission to understand why the industry has a strong incentive to achieve this without the need for regulatory intervention. Granted that the potential is great for BPL to provide broadband Internet access for people who wish to “surf the web.” However, additional potential for BPL lies in letting chip sets in a wide variety of electric devices<sup>10</sup> communicate with each other with little or no human intervention.<sup>11</sup> This data traffic must proceed seamlessly within your home, your office, and the commercial and public external systems you use in order to render the greatest benefits to you in productivity, convenience and security. Thus, the industry has a strong incentive to work toward seamless integration and

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<sup>8</sup> Services can be expanded as fiber is extended under a “smart build” approach.

<sup>9</sup> See Note 10 below.

<sup>10</sup> We use that term in its broadest sense to encompass “information appliances,” other appliances, internal building systems, external utility and traffic control systems, and virtually any other device connected to the electric grid.

<sup>11</sup> The industry may prefer the term “power line communications” because the term “broadband over power line” tends to suggest high speed web access for users and to overlook the importance of data traffic between devices.



interoperability of in-house (or rather in-building BPL) and access BPL and it appears unlikely Commission intervention would be necessary.

3. Protection of Third Parties.

Para. 20 of the NOI poses the most critical questions for the BPL industry. It is important for the Commission to get the answers right if it intends to create a third wire competitor to homes, offices and government facilities. While there are a number of detailed questions, we will try to address three broad questions: what can be done to mitigate impacts on third parties besides emissions limits; should the Class A or Class B limits apply to access BPL; and, if the limits are to be amended, what should the new limits be?

a. Mitigation Techniques.

Regarding mitigation techniques, as with any digital device, there are a variety of mitigation techniques that can be used and are being used to meet the emissions limits. As the Commission is aware, technology companies routinely employ many well-established techniques to reduce unwanted emissions, ranging from simple methods such as shielding, to complex software and circuitry. Likewise, third parties must be held responsible for taking steps to mitigate their vulnerability to interference. The Commission recently recognized as much in proposing that receiver standards, not just transmitter standards, be used in order to enable more users and more technologies to share radio spectrum. Rather than dictating specific mitigation techniques, we recommend that the Commission stick with setting emission limits, defined both in terms of what transmitters can generate and in terms of what receivers have to be able to tolerate.

b. Distinguishing Between Underground And Overhead Installations.

Mitigation methods differ significantly as between overhead and underground installations. Underground BPL systems are contained in conduits. Typically, electric lines do not share conduit with other electric based services, although they may share conduit with fiber optic services. Therefore, cable television or DSL lines typically would not be in the same conduit with access BPL lines and the conduit and surrounding earth, concrete or other material would provide substantial shielding that would make interference unlikely, even at emissions levels significantly higher than existing limits.

In the overhead configuration, it is important to remember that while the Pole Attachments Act gives cable television and DSL providers access to utility poles, they must be located within the “communications space.” Under the NESC, the communications space must be separated from the electric distribution space in order to protect communications workers from contact with medium voltage lines. BPL access would be located in the electric distribution space and as a result would not be immediately adjacent to coaxial cable or twisted pair. Certainly, those providers would not be overlashing directly onto BPL access lines as they do among their own lines.

As is the case with receivers, other parties must mitigate their potential vulnerability to interference. Because of aeronautical signal leakage, cable television systems must shield their own emissions in a manner that protects them from third party emissions. In the case of both cable television and DSL service, it is important to remember that these systems, like access BPL access, are hybrid systems. The fiber optic portions of these systems are being extended further into the network, as also will be the case with BPL. Those portions of the networks that carry

RF signals, as opposed to photonic signals, are shrinking and so is the potential impact of RF emissions.

#### 4. Access BPL Systems Are Class A Not Class B Devices.

Class A limits should apply to BPL access systems regardless of whether they are located in residential, commercial or industrial neighborhoods. Medium voltage electric utility facilities operating at thousands of volts cannot be characterized as a “residential environment.” The term “residential environment” refers to the inside of a dwelling. These facilities do not pass through residential dwellings. Their proximity to residential dwellings is limited by the NESC. Moreover, while the Commission in most cases can classify the inside of a structure as being residential, commercial or industrial in use, the Commission lacks any practical ability to classify “neighborhoods”, many of which contain a variety of uses and structures.

Clearly, in the underground or conduit configuration, the utility facility is contained within its own “environment” that is physically separated from other nearby “environments”. Thus, BPL access systems in underground and other conduit configurations clearly fall under Class A limits.

#### 5. Changes To The Emissions Limits.

Electric Broadband believes that the test data will show that emissions limits can be raised without causing harmful interference to other users. Technological improvements made since these limits were adopted have improved the ability of receivers to distinguish between desired and undesired signals. Further improvements are being rapidly developed and deployed as the cost of implementing new circuit designs in silicon is rapidly falling. Furthermore, the potential for harmful interference from or to BPL systems will continue to decrease with the transition of communications networks to fiber.

While it may appear counterintuitive, higher emissions limits for BPL may tend to minimize the impact on other users. Higher limits would enable electric utilities and their service partners to construct BPL systems at lower expense and with higher throughput. This will enable them to sign up more customers faster. The sooner they do, the sooner they will extend fiber to serve those customers, converting increasing portions of their systems from RF to photonic technology.

Restrictions on the roll-out of BPL would delay electric utilities and their service partners from gaining the customer base they need to deploy what ultimately will be a largely fiber-based network. Strict emissions limits that act as a barrier to entry placed in the way of BPL service, would only lessen the pressure on cable and DSL providers to upgrade their services. More favorable BPL rules will introduce competition that will spur upgrades of other hybrid networks. Such upgrades largely mean more fiber, thereby mitigating RF emissions concerns.<sup>12</sup>

#### B. Measurement Methods.

With respect to the questions posed in paragraph 23 of the NOI, Electric Broadband agrees with the Commission that the process of testing CCS devices has been difficult, time consuming and costly.<sup>13</sup> However, the Commission should not over characterize the difficulty of measuring emissions from carrier current systems. Over many years of experience under Part 15, it must be said that many types of devices initially pose measurement challenges and the Rules often require interpretation, even when applied to devices that on their face appear simple to test. Difficulties often arise because devices and components may be connected to other devices and components and may be used in a variety of configurations and applications. The

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<sup>12</sup> While some may attempt to argue that “too much” competition can make it difficult for a company to obtain the financing it needs to expand its fiber network, the Commission has long since learned that one company, free from challenge, has little or no incentive to innovate.

<sup>13</sup> NOI at para. 23.

mere fact that CCS devices may require interpretive analysis of the rules does not make them suspect or provide an argument for restrictive treatment.

Part 15 provides significant leeway for the Staff to work with testing laboratories and manufacturers to arrive at acceptable measurement methods.<sup>14</sup> Moreover, the Commission's Rules generally refer to measurement methods developed by private industry, particularly the American National Standards Institute (ANSI). Thus, a strong role is carved out for industry to address technical questions, rather than have the Commission attempt to duplicate or replace such efforts. Commission Rules also recognize that the U.S. market, while large and important, exists within a global context. The European Union, in particular, is an important market to consider in defining the regulatory environment for new products and services.

The Commission's Part 15 Rules generally permit the use of CISPR standards as an alternative to the emissions limits contained in Part 15.<sup>15</sup> The Commission is correct that CISPR is working on a conducted emissions test procedure for CCS devices.<sup>16</sup> However, an open field test site radiated emissions test procedure may be comparable or preferable.<sup>17</sup> As a practical matter, measurement methods tend to evolve and be honed over time. Incorporating specific requirements into the Rules themselves, which may require lengthy proceedings to update, would be less desirable than other alternatives.

Alternatives include making reference to standards and testing methods established by recognized industry bodies such as ANSI and CISPR, allowing Telecommunications Certification Bodies (TCBs) to agree upon test procedures in conjunction with the testing

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<sup>14</sup> For example, Section 15.31(b) urges the use of specified procedures but allows "other procedures" where it can be demonstrated that "such other procedures can be relied upon to produce measurement results compatible with FCC measurement procedures."

<sup>15</sup> See, for example, Sections 15.107(e) and 15.109(g).

<sup>16</sup> NOI at para. 15, apparently referring to CISPR/I/44/CD.

<sup>17</sup> See Comments of Adaptive Networks filed herein on June 25, 2003.

laboratories that submit the applications for certification,<sup>18</sup> and resolving testing questions in response to letter requests for rulings dealing with specific, focused issues. The Commission needs to consider whether many of the technologies in use today, including cable television, DSL, and ethernet, would have passed the degree of scrutiny that the NOI focuses on BPL. Yet in the real world these technologies co-exist with other users without dire consequences.

Test procedures are intended to be reasonably predictive of real world results, not to become an end in themselves. New technologies such as BPL should be allowed to proceed after reasonably reliable testing has been done. The Rules provide ample authority for the Commission to require corrective action if actual incidents of interference can be demonstrated. Testing can never be a complete substitute for real-world experience. BPL testing procedures, while imperfect, are more than sufficient to permit deployment to proceed without further delay.

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<sup>18</sup> This procedure seems particularly apt if the Commission decides to adopt its own suggestion of requiring certification of CCS devices. NOI at para. 26.

### III. Conclusion

Wherefore, for the foregoing reasons, Electric Broadband respectfully requests that the Commission expeditiously resolve this proceeding in a manner consistent with the Comments provided herein.

Respectfully submitted,

ELECTRIC BROADBAND

By: \_\_\_\_\_/S/\_\_\_\_\_  
James A. Stenger

THELEN REID & PRIEST LLP  
701 Pennsylvania Avenue, N.W.  
Suite 800  
Washington, DC 20004  
(202) 508-4308

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